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Prevalence of poor sleep quality among adults in Jeddah, Saudi Arabia

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ABSTRACT

Background: Poor sleep is becoming a growing concern for adults due to its lasting impact on both physical and mental well-being. Due to many individuals having inadequate sleep, there is a worldwide concern about the quality of sleep. **Aims:** Our article aims to identify the prevalence of poor sleep quality among the adult population in Jeddah and raise awareness regarding the long-term unhealthy consequences of poor sleeping. **Methods:** A cross-sectional study was conducted amongst adults aged 18-60 in Jeddah. Participants were selected through convenience sampling. Data collection involved the administration of the internationally standardized Pittsburgh Sleep Quality Index (PSQI) questionnaire to capture sociodemographic indicators and sleep quality. Analyses were performed using IBM SPSS version 26 using inferential statistics, including chi-square test and logistic regression. Statistical significance was established for $p < 0.05$. **Results:** Poor sleep quality was reported by 25.38% of participants, with women being (27.5%) more affected than men (21.2%). Logistic regression analysis revealed that gender and age significantly influenced sleep duration ($p = 0.006$ and $p = 0.011$) and overall sleep quality ($p = 0.015$ and $p = 0.035$, respectively). These findings highlight the importance of age and gender in sleep quality among the study population. **Conclusion:** Poor sleep quality is common among adults in Jeddah. Women report poor sleep than men. It's important to begin screening for sleep disorders in clinical settings. Early identification and treatment of these issues can prevent long-term health problems and enhance overall quality of life.

Keywords: Poor sleep quality, Pittsburgh Sleep Quality Index, Jeddah, Saudi Arabia

1. INTRODUCTION

Sleep comprises a crucial part of the sleep-wake cycle characterized by 8 hours of nocturnal sleep and 16 hours of daytime activity and wakefulness in humans. In contrast to activity, sleep is a period of inactivity that restores and recharges the body's ability to perform mental and physical functions. Sleep is a critical time frame during which the body stores the information provided during daytime wakefulness. During sleep, the body also rejuvenates connection and communication between various parts of the brain. Healthy sleeping habits replenish the quality of life by providing a wide range of benefits, including higher energy levels, better cognitive functioning, a more robust immune system, alertness, and overall performance (Carley and Farabi, 2016).

The American Academy of Sleep Medicine and Sleep Research Society and the National Sleep Foundation's consensus statement suggest that adults must sleep 7 hours or more hours per night to maintain optimal health. Being unable to complete this minimum duration of sleep would, in turn, result in detrimental health concerns. Some consequences include mood disorders, weakened immune system, increased risk of cardiovascular disease, disruption of hormones, metabolic disorders, and development of chronic conditions (obesity, diabetes, and certain cancers). Lack of sleep negatively impacts one's quality of life and has significant effects on physical and mental well-being, underscoring the importance of valuing sleep patterns (Watson et al., 2015).

A large-scale study by researchers at the University of Warwick Medical School in the UK examined the prevalence of sleep disorders in eight Asian and African countries. The study revealed that approximately 17% of the population in these developing nations suffer from sleep problems, a figure not too far off from the estimated average of 20% in developed countries (Berhanu et al., 2018). In developed countries such as the United States, it is estimated that between 50 and 70 million people suffer from chronic sleep disorders (Kajeepta et al., 2015). In Korea, 41.0% of the overall population reported experiencing poor sleep quality, with the high percentage being associated with sociodemographic factors and bad health (Lee et al., 2020). A study conducted during the COVID-19 pandemic in Italy found that 57.1% of the subjects reported poor sleep quality (Franceschini et al., 2020).

Similarly, in Kashmir, India, the prevalence of poor sleep quality was found to be 53%, with the reported mean PSQI score of 6.90 ± 3.82 . As age increases, so does the tendency to have sleep problems. It was shown that for individuals aged 60-69, the sleep disorder prevalence was 32.1% and rose to 52.5% for individuals over 80. The study also concluded that individuals with solitary lifestyles are 1.62 times more likely to experience poor sleep quality than those who are surrounded by people (Bhat et al., 2020). Other studies conducted in Turkey indicated the prevalence of poor sleep quality was 55.1%, with increased signs of psychological distress Duran and Erkin, (2021), while a survey conducted in Japan showed a PSQI score of 5.8 with similar findings of physical and mental issues (Matsui et al., 2021).

A study conducted in Singapore revealed that 11.1% had poor sleep quality while 52.6% of the participants had less than 7 hours of sleep (Vaingankar et al., 2020). Similarly, a cross-sectional study in Shanghai, China, revealed poor sleep quality patterns with a PSQI score of 3.69 ± 2.57 with a positive association with anxiety, and chronic diseases (Wu et al., 2020). A significantly large number of previously conducted studies emphasized high proportions of anxiety, poor health conditions, and low educational status among the general population in different countries, for example, in Gujarat, India (31%) Tolani et al., (2021), Nigeria (42%) Jemilohun et al., (2022), and Bangladesh (55.1%) (Islam et al., 2021).

Locally in KSA, the prevalence of stress and poor sleep routine in the general population is reported as 67.3% in Riyadh (AlKhaldi et al., 2023). The PSQI is a standardized and validated questionnaire used worldwide to assess the prevalence of poor sleep quality (Zhang et al., 2020). However, the prevalence of poor sleep quality among adults residing in Jeddah city has not been widely accessed. Our study aims to identify poor sleeping patterns prevalent in the individuals residing in the city of Jeddah and has the objective of increasing awareness about the negative impact of poor sleep on the overall health of an individual.

2. METHOD

Methodology

This descriptive cross-sectional study was conducted in Jeddah City, situated in the Commonwealth of Saudi Arabia. The city's population, who come from different socio-economic groups and cultures, makes the sample representative of adults originally living in the country. After calculating the sample size, it was found that were 457 participants required for this study.

Sampling method

Convenience sampling methods were used to select participants for the study to enhance the feasibility of data collection within the specified timeframe. The convenience sampling method was adopted as it enabled us to gather data from accessible populations without extensive recruitment efforts quickly and proved to be advantageous for our study conducted with limited resources and time constraints.

Study subjects

Inclusion criteria for study subjects included adults aged 18-60 residing in the Jeddah city of Saudi Arabia, regardless of nationality. Patients with psychiatric comorbidities, those taking hypnotic drugs, and those in hospitals were excluded from the study.

Data Collection

Patients were requested to log on to Google Forms in order to take a questionnaire that drew its design from the Pittsburgh Sleep Quality Index. A questionnaire was changed from the English language to the Arabic language for reasons of cultural and linguistic appropriateness using a translator authorized for the purpose. Also, the questionnaire was robustly edited by forensic speakers of both languages to ensure that the questions under study were appropriately formulated.

Ethical considerations

The approval for the study was obtained from the institutional review board (IRB) to make sure that the study meets all guidelines relevant to the ethical standards. Strict ethical guidelines were implemented to protect the participants’ rights and confidentiality. It was ensured that data collected through a questionnaire was only available to the researchers involved in the project and that the said data was stored in password-protected hard drives. Each participant was given a unique code and the study does not trace to them in terms of personal information. Every respondent had to agree to the terms of participating in the survey given on Google Forms after she or he knew the objective of his or her participation in the study. They were assured of anonymity and informed that only collective results would be analyzed for study purposes and disclosed in the manuscript.

Data analysis

The IBM Statistical Package for Social Studies (SPSS) Version 26 was used for the statistical analysis. Descriptive statistical tests were used to enumerate the frequencies of demographic characteristics and sleep quality parameters. Inferential statistics, such as chi-square tests and logistic regression analysis, were applied to explore associations between variables. Statistical significance was assessed at a p-value of less than 0.05.

3. RESULTS

A total of 457 participants were included in the study. Females participated more than males. Table 1 summarizes the key findings of the research sample, including age, average global PSQI score, and average hours of sleep.

Table 1 Sleep quality concerning age and gender of the subjects

| Parameters | Males N=151 | Females N=306 | Total N=457 |
|---------------------------|----------------|------------------|----------------|
| Age (M, SD) | 25.75, ± 8.19 | 23.97, ± 10.04 | 26.45, ± 9.15 |
| Global PSQI score (M, SD) | 5.974, ± 2.72 | 7.315, ± 3.46 | 6.644, ± 3.28 |
| Hours of sleep (M, SD) | 6.546, ± 1.51 | 6.842, ± 1.75 | 6.694, ± 1.63 |

Abbreviations – PSQI: Pittsburgh Sleep Quality Index; M: Mean; SD: Standard Deviation

The findings reveal that the mean total sleep duration is 6.69 hours. Men and women show little to no difference in the sleeping pattern hence concluding that Gender does not greatly affect the sleep time, except with a slight variation with men sleeping around 0.296 hours less in a night compared to women. However, gender influences the PSQI scores painstakingly because the average PSQI

was equal to 6.64. Within the males' group, the PSQI score was lower at 5.97 whereas the PSQI score was significantly higher at 7.31 among the females.

Table 2 Proportion of subjects by gender with poor sleep quality

| Component of PSQI | Male N (%) | Female N (%) | Total N (%) |
|--|---------------|-----------------|----------------|
| Component 1 – Sleep quality (bad/very bad) | 32 (21.2) | 84 (27.5) | 116 (25.38) |
| Component 2 – Latency (>15 minutes) | 107 (70.9) | 254 (83.0) | 361 (78.99) |
| Component 3 – Duration (< 7 hours) | 110 (72.8) | 201 (65.7) | 311(68.05) |
| Component 4 – Efficiency (< 85%) | 32 (21.2) | 80 (26.1) | 112 (24.50) |
| Component 5 – Disturbance (Score > 10) | 43 (28.5) | 117 (38.2) | 160 (35.01) |
| Component 6 – Use of medication (yes) | 23 (15.2) | 55 (18.0) | 78 (17.06) |
| Component 7 – Day dysfunction (yes) | 109 (72.2) | 247 (80.7) | 356 (77.89) |
| Global PSQI score (Total PSQI > 5) | 97 (64.2) | 246 (80.4) | 343 (75.05) |

Abbreviations - PSQI: Pittsburgh Sleep Quality Index

In terms of the global PSQI criteria, these findings suggest that female participants are characterized as experiencing worse sleep as compared to male participants. The females suffer from poor sleep quality more compared to males. Table 2 summarizes the components of the sleep quality with regards to the frequencies among the gender. The younger age group is suffering from poor sleep quality more often than the older population. Table 3 summarizes the poor sleep quality components in different age groups.

Table 3 Proportion of subjects by age with poor sleep quality

| Component of PSQI | Less than 25 years of age N (%) | More than 25 years of age N (%) | Total N (%) |
|--|---------------------------------------|---------------------------------------|----------------|
| Component 1 – Sleep quality (bad/very bad) | 83 (28.1) | 33 (20.4) | 116 (25.38) |
| Component 2 – Latency (>15 minutes) | 235 (79.7) | 126 (77.8) | 361 (78.99) |
| Component 3 – Duration (< 7 hours) | 194 (65.8) | 117 (72.2) | 311 (68.05) |
| Component 4 – Efficiency (< 85%) | 74 (25.1) | 38 (23.5) | 112 (24.50) |
| Component 5 – Disturbance (Score > 10) | 100 (33.9) | 60 (37.0) | 160 (35.01) |
| Component 6 – Medication Usage (yes) | 51 (17.3) | 27 (16.7) | 78 (17.06) |
| Component 7 – Daytime dysfunction (yes) | 238 (80.7) | 118 (72.8) | 356 (77.89) |
| Global PSQI score (Total PSQI > 5) | 231 (78.3) | 112 (69.1) | 343 (75.05) |

Abbreviations - PSQI: Pittsburgh Sleep Quality Index

The use of sleep medication was similar between the groups, with 17.3% of younger and 16.7% of older participants taking medication. Table 4 shows the significance of gender and age-related to the sleep quality components.

Table 4 Univariate Logistic Regression Analyses: Gender and Age Effects on Sleep Quality

| Component of PSQI | Gender | | | Age | | |
|--|--------|--------------|-------|-------|-------------|-------|
| | OR | 95% CI | p | OR | 95% CI | p |
| Component 1 – Sleep quality (bad/very bad) | 0.843 | 0.509-1.397 | 0.508 | 0.636 | 0.386-1.046 | 0.075 |
| Component 2 – Latency (>15 minutes) | 0.713 | 0.423- 1.203 | 0.205 | 1.159 | 0.680-1.975 | 0.588 |
| Component 3 – Duration (< 7 hours) | 1.976 | 1.215-3.215 | 0.006 | 1.836 | 1.152-2.926 | 0.011 |
| Component 4 – Efficiency (< 85%) | 0.923 | 0.561-1.519 | 0.754 | 1.007 | 0.625-1.623 | 0.978 |
| Component 5 – Disturbance (Score > 10) | 0.895 | 0.553-1.449 | 0.651 | 1.590 | 1.000-2.529 | 0.050 |

| | | | | | | |
|---|-------|-------------|-------|-------|-------------|-------|
| Component 6 – Medication Usage (yes) | 1.129 | 0.635-2.008 | 0.680 | 1.109 | 0.638-1.928 | 0.713 |
| Component 7 – Daytime dysfunction (yes) | 0.957 | 0.546-1.678 | 0.878 | 0.789 | 0.456-1.366 | 0.398 |
| Global PSQI score (Total PSQI > 5) | 0.438 | 0.226-0.852 | 0.015 | 0.492 | 0.255-0.950 | 0.035 |

Abbreviations - PSQI: Pittsburgh Sleep Quality Index; OR: Odds Ratio; 95%CI: Confidence Interval of 95%w

The odds of males having slept less than 7 hours is 1.976 times higher than females with a 95% CI of 1.215 to 3.215. The females had a global PSQI score greater than 5, indicating poor sleep quality, with a significantly higher proportion of females $p = 0.015$ compared to males. The odds of having sleep less than 7 hours in people younger than 25years is 1.836 times higher as compared to people more than 25 years with a 95% CI of 1.152 to 2.926. The younger population less than 25 years of age had a global PSQI score greater than 5, indicating poor sleep quality, with a significantly higher proportion of $p=0.035$ as compared to the older population.

4. DISCUSSION

This study sought to address the increasing concern of poor sleep quality and sleep deprivation among the adult population of Saudi Arabia, which can have significant detrimental effects on health and well-being in the long run. Poor sleep patterns, characterized by shorter duration and longer sleep latency, have become prevalent globally, posing a threat to mental health. A recent study conducted among the healthy adult population in Riyadh, the capital of Saudi Arabia, concluded alarming results, reporting 87.7% (733 respondents) out of 836 individuals suffered from poor sleep with significantly high PSQI scores, indicating a high prevalence of poor sleeping habits (AlRasheed et al., 2022). However, the prevalence of poor sleep quality among the broader adult population residing in various regions across Saudi Arabia remains largely unknown. Our study findings provide crucial insights into the sleeping patterns and challenges faced by individuals in Jeddah.

Our study included adults aged 18-60 years residing in Jeddah, with a sample size of 457 participants. Interestingly, it was found that the adult population of Jeddah has a high prevalence of poor sleep quality, as indicated by the average global PSQI score of 6.64. A total of 25.38% had poor sleep quality, with a higher prevalence among females (27.5%) compared to males (21.2%). It has been scientifically proven that women report poor sleep quality than men and have a higher risk of insomnia due to variations in many factors, such as reproductive hormones and stress depression (Fatima et al., 2016). Strangers conducted a cross-sectional study of 8 countries across Africa and Asia (South Africa, Tanzania, Kenya, Ghana, Vietnam, Bangladesh, Indonesia, and India), including 24,434 women and 19,501 men, all aged ≥ 50 years, to assess sleep problems.

The study reported nocturnal sleep problems across the eight populations and found a higher prevalence of self-reported sleep problems in the women population than in men. Overall, 16.6% of participants reported experiencing nocturnal sleep problems, with women reporting a higher prevalence of 19.8% and men reporting a 12.8% prevalence (Alonzo et al., 2021). Similarly, our study exhibited elevated scores of women across all components of PSQI indicative of poor sleep quality; a notable one is the bad sleep quality component reported by 27.5% of females, which is 6.3% higher than men (21.2%). Our results contrast with another survey conducted in Al-Ahsa that demonstrated male prevalence in poor sleep quality. The study of Albinsaleh et al., (2023) includes data collected from 433 visitors and identified 72.5% (314 respondents) having a PSQI score of above five as poor sleepers.

Here, the males comprised the majority, and 72% of males reported poor sleep quality. Moreover, this research stated there was no significant difference between the males and females. This finding contradicts the outcomes of our study. Our study also unveiled differences in sleeping patterns among the adult population of Jeddah, with the majority reporting unsatisfactory sleep durations. Females were more likely to get less than 5 hours of sleep per night. As stated in the results, 17% of the female population slept for less than 5 hours each night compared to 7.9% of the male population. Additionally, a significant female population demonstrated difficulties falling asleep three or more times a week (14.8% more than males), 6.6% more males than females reported waking up in the middle of the night once-twice per week, and 3.8% more males reported sleep disruptions from bathroom usage more than three times a week.

Interestingly, discomfort in breathing and loud coughing/snoring were less prevalent concerns among the respondents. However, significant proportions of individuals reported experiencing discomfort from feeling too cold or hot. The studies revealed that a total of 24.5% of females (9.3% more than males) faced trouble sleeping due to feeling too cold three or more times a week, while 22.9% of females (9.7% more than males) had trouble sleeping once-twice a week due to hot temperature. Our findings also highlight gender

differences and the role of age and gender in influencing sleeping patterns. Females reported slightly more difficulties falling asleep within 30-60 minutes and waking up during the night than males. 23.2% of females woke up in the middle of the night or early morning (8.6% more than males). 54.6% of females usually fall asleep for 16 minutes to 1 hour each night.

These results make it evident that sleep quality is a significant concern among adults in Jeddah. Among the factors that lead to poor sleep quality are sleeping for less time, interruptions in sleep, and external discomfort from the environment around. This study underscores the necessity of introducing sleep-promoting interventions and enhancing sleep among people in this region. Firstly, it informs the general public and healthcare providers that females struggle with their sleep quality more than males. Secondly, it encourages individuals to obtain adequate sleep duration after discovering that the average sleep was 6 hours, which falls short of the recommended 7 hours or more per night suggested by the American Academy of Sleep Medicine and Sleep Research Society for maintaining good health.

This study further identifies the specific areas where individuals commonly face problems regarding sleep, such as temperature variations, waking up at night, and disturbances in sleep due to the need to use the bathroom. Our findings revealed that issues, such as temperature control, either feeling too cold or too hot, nocturnal awakenings and difficulty falling asleep, are also prevalent among the participants, with statistical tests revealing significant female predominance in all the mentioned three areas. For temperature variations, a considerable amount of 26.1% of females reported feeling cold, and 22.9% of females reported feeling hot once or twice a week, in contrast to 15.9% of males and 13.2% of males, feeling too cold or too hot, respectively. It was further reported that 35.9% of females experience nocturnal awakening compared to 31.1% of males in a duration of 3 or more times a week.

On the contrary, nocturnal disruptions are rather rampant among males, with over a quarter (26.5%) of them waking up once or twice a week compared to 19.9% of females. This study considers the great necessity of engaging far-reaching strategies or steps that will enforce adherence to healthy sleep behaviors among the populace. Nonetheless, limitations to our findings do exist, affecting the generalizability of the results. Above all, the collected data is based on self-reported questionnaires which can have a consequence of subject bias. Additionally, the study was only restricted to Jeddah city in the western region of the Kingdom of Saudi Arabia presenting a challenge to the background of the study. There is a need for further research to assess sleep quality in different regions of Saudi Arabia. This may also cover significant socio-cultural factors that cause sleep problems.

5. CONCLUSION

We found that in the study area, the city of Jeddah, Saudi Arabia, there exists, poor sleep quality among many adults. Additionally, we found that more women suffer from poor sleep quality than men. This highlights the need for a screening process to identify and address sleep disorders in our clinical practice. By identifying these issues early, we can manage them effectively and help prevent long-term health problems, such as heart disease, diabetes, and mental health conditions. Improving sleep quality can significantly enhance our patient's overall well-being and quality of life.

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Author's Contribution statement

All authors made substantial contributions to the conception, design of the work, acquisition, analysis, and interpretation of data for the work, drafting the work and reviewing it critically for important intellectual content, finally approved the version to be published and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Husna Irfan Thalib formulated the research question and designed the study.

Shyma Haidar Ali, Ayesha Hanin Shaikh, and Sariya Rafi Khan prepared the online questionnaire, appointed data collectors, carried out the data collection, and organized the data for analysis. Ayesha Mohtashim Jamal, Nadeem Muhammad Ikram, and Husna Irfan Thalib were responsible for analyzing the data and creating the results tables. Hadiyah Nadeem Ikram, Renad Omar Bajri, and Ayesha Hanin were responsible for writing the article. Husna Irfan Thalib, Sariya Rafi Khan, and Hadiyah Nadeem Ikram reviewed the article and ensured that the manuscript was free of grammatical errors.

Ethical approval

Ethical approval has been given by the Institutional Review Board (IRB) of our institution, Batterjee Medical College, Jeddah, Saudi Arabia (RES-2023-0083).

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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